Claims:

We claim:

1. A process of polymerizing olefin(s) to produce a polyolefin comprising contacting in a reactor olefins and a catalyst composition comprising a Group 15 containing compound and a bulky ligand metallocene catalyst compound at a reaction temperature of from 30°C to 120°C; wherein raising or lowering the reaction temperature narrows or broadens the Mw/Mn of the polyolefin, respectively; and wherein the Group 15 containing metal compound is represented by the formulae:

$$R^{3}$$
 L R^{1} R^{6} R^{3} R^{2} R^{2} R^{7} R^{5}

or

wherein M is a Group 4, 5 or 6 metal;
each X is independently a leaving group;
y is 0 or 1;
n is the oxidation state of M;
m is the formal charge of the ligand comprising the YZL or YZL' groups;

L is a Group 15 or 16 element;

L' is a Group 15 or 16 element or Group 14 containing group;

Y is a Group 15 element;

Z is a Group 15 element;

 R^1 and R^2 are independently a C_1 to C_{20} hydrocarbon group, a heteroatom containing group having up to twenty carbon atoms, silicon, germanium, tin, lead, or phosphorus; wherein R^1 and R^2 may be interconnected to each other; R^3 is absent or a hydrocarbon group, hydrogen, a halogen, a heteroatom containing

R³ is absent or a hydrocarbon group, hydrogen, a halogen, a heteroatom containing group;

R⁴ and R⁵ are independently an alkyl group, an aryl group, substituted aryl group, a cyclic alkyl group, a substituted cyclic alkyl group, a cyclic arylalkyl group, a substituted cyclic arylalkyl group or multiple ring system; wherein R⁴ and R⁵ may be interconnected to each other;

R⁶ and R⁷ are independently absent, or hydrogen, an alkyl group, halogen, heteroatom or a hydrocarbyl group; and

R* is absent, or is hydrogen, a Group 14 atom containing group, a halogen, a heteroatom containing group.

2. The process of Claim 1, wherein R⁴ and R⁵ are represented by the formula

wherein R^8 to R^{12} are each independently hydrogen, a C_1 to C_{40} alkyl group, a halide, a heteroatom, a heteroatom containing group containing up to 40 carbon atoms.

- 3. The process of Claim 2, wherein R⁸ to R¹² are each independently a C₁ to C₂₀ linear or branched alkyl group, wherein any two R groups may form a cyclic group or a heterocyclic group, and wherein the cyclic group may be aromatic.
- 4. The process of Claim 1, wherein M is a Group 4 metal and each of L, L', Y and Z are nitrogen atoms.
- 5. The process of Claim 1, wherein the catalyst composition is supported.
- 6. The process of Claim 1, wherein the catalyst composition further comprises an activator; wherein the catalyst composition is introduced into the reactor in an alkane as a solution, suspension or emulsion.
- 7. The process of Claim 1, wherein the process is a slurry process or a gas phase process.
- 8. The process of Claim 1, wherein the olefins are ethylene and at least one olefin comonomer selected from olefins having from 4 to 12 carbon atoms.
- 9. The process of Claim 8, wherein a polyethylene copolymer is isolated having a bimodal molecular weight distribution; and wherein the Mw/Mn value of the copolymer ranges from 20 to 40.
- 10. The process of Claim 9, wherein the copolymer comprises a high molecular weight component and a low molecular weight component; wherein the weight average molecular weight M_w of the high molecular weight component of the copolymer is above 150,000 a.m.u.
- 11. The process of Claim 10, wherein the weight average molecular weight M_w of the high molecular weight component of the copolymer is above 250,000 a.m.u.
- 12. The process of Claim 8, wherein a polyethylene copolymer is isolated having a density in the range of from 0.940 to 0.947 g/cm³.

- 13. The process of Claim 8, wherein a polyethylene copolymer is isolated having a I_{21}/I_2 value of 80 or more.
- 14. The process of Claim 8, wherein a polyethylene copolymer is isolated having a I₂ between 0.01 and 10dg/min.
- 15. The process of Claim 8, wherein a polyethylene copolymer is isolated having an extrusion rate of greater than about 17 lbs/hour/inch of die circumference.
- 16. The process of Claim 8, wherein the polyethylene copolymer is formed into a film or a pipe.
- 17. The process of Claim 8, wherein the C_x/C_2 ratio, where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between about 0.001 to 0.0100.
- 18. The process of Claim 1, wherein the Group 15 containing catalyst compound and the bulky ligand metallocene compound are combined at molar ratios of from 10:90 to 90:10.
- 19. The process of Claim 1, wherein the bulky ligand metallocene catalyst compound comprises at least one fluoride or fluorine containing leaving group.
- 20. The process of Claim 7, wherein the process is a gas phase fluidized bed process; and wherein the C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between about 0.001 to 0.010.
- 21. The process of Claim 1, wherein the properties of the polyolefin are controlled by changing the amount of bulky ligand metallocene catalyst compound combined.
- 22. The process of Claim 1, wherein the polyolefin is produced in a single reactor.